

regulatory changes, including changes in income tax rates) was to reduce carrier access charges an additional \$4.493 billion (annually) by 1990.<sup>5</sup> By 1990, carrier access charge expenditures were approximately \$9.266 billion less per year because of these changes in federal regulatory policy.

Thus access charges, which constitute a large fraction of the marginal cost of interexchange carriers, fell significantly over the post-divestiture period due to the implementation of subscriber line charges and changes in separations policy. Indeed, AT&T lowered its interstate toll rates over this period, reflecting this reduction in its marginal cost. However, AT&T's total price reduction over this period was no larger than the amount by which its access charges were reduced. See Exhibit 1.

This finding is important in interpreting the U.S. experience with competition for interstate toll services. It suggests that beyond the mandatory reflection of access charge reductions in AT&T's rates, which were then followed by the other IXC's, interexchange carriers initiated no significant price competition for toll services.<sup>6</sup> Indeed, the current situation could better be described as a regulated price umbrella: MCI and Sprint generally followed AT&T price reductions but the gap in prices shrunk from 10-20 percent in mid-1984 to about 5 percent in 1987 when the unequal access discount was essentially eliminated.<sup>7</sup> This lack of price reductions among the IXC's is surprising for two reasons. First, this period witnessed significant erosion in AT&T's share of U.S. interstate toll services, falling from about 84 percent in 1984 to 63 percent in 1991.<sup>8</sup> Second, we observe comparatively large reductions in real interstate toll rates (adjusted for changes in access charges) during the period before divestiture and equal access.<sup>9</sup> If we adjust interstate toll rates to account for the changes in the non-traffic sensitive cost assignment in the Ozark Plan between 1972 and 1984, we observe that real interstate toll rates, net of changes in separations, fell at an annual rate of 6.28 percent.<sup>10</sup> See Exhibit 2. Since inflation averaged approximately 3.6 percent per year from 1984 to 1989, real interstate toll rates, net of changes in access charges, fell at an annual rate of 3.6 percent. Net of access charge changes, real interstate toll rates fell roughly twice as fast in the decade before divestiture than in the six years after. This finding is hardly consistent with the view that competition among interexchange carriers led to drastically lower prices. Rather, it suggests that the type of competitive entry experienced for U.S. interstate toll

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<sup>5</sup>Ibid. Table 5.

<sup>6</sup>This generalization applies to aggregate interstate toll service. There is evidence of competitive pressure reducing toll rates (i) for large business customers (e.g., through new services such as Megacom, Prism, and Ultra-WATS), and (ii) in the intrastate toll markets where long-haul rates fell and short-haul rates rose from 1983 to 1987 (see A. Mathios and R. Rogers, "The Impact of Alternative Forms of State Regulation of AT&T on Direct-Dial Long-Distance Telephone Rates," The Rand Journal of Economics, Autumn 1989, p. 446).

<sup>7</sup>See Michael E. Porter, "Competition in the Long Distance Telecommunications Market: An Industry Structure Analysis," filed with AT&T's Comments in CC Docket 87-313, October 19, 1987.

<sup>8</sup>FCC, "Long Distance Market Shares: First Quarter, 1991," June 28, 1991, Table 3.

<sup>9</sup>Competition in interstate switched services technically began in 1974 with the entry of MCI's Execumt Service, but it is difficult to describe real rate reductions during this period as due to competition since (i) there was very little competition, and (ii) real interstate toll rates fell at an annual rate of 4.8 percent between 1973 and 1974 and at 2.2 percent during the post-Execumt period from 1974 to 1983.

<sup>10</sup>1972 is the earliest year for which BLS price data for interstate toll service is available.

services since divestiture may not encourage price rivalry for ordinary interstate toll calling.<sup>11</sup>

A second possible consequence of competition for interstate toll services was growth in demand. While changes in the units of measurement make it difficult to compare pre- and post-divestiture interstate toll growth rates, the evidence suggests that toll demand grew more rapidly in the post-divestiture period. Between 1962 and 1982, annual growth in interstate minutes of use averaged 10.5 percent.<sup>12</sup> From 1984 to 1990, interstate switched access minutes of use grew at an annual rate of 12.9 percent,<sup>13</sup> and this measure of demand probably understates demand growth, as it ignores demand served by bypass services, including WATS and MEGACOM-type services. Competition is sometimes alleged to have caused this increase in demand through reducing prices and also through increased marketing activities (such as advertising) and the introduction of new services. Indeed, the Commission cites overall traffic growth as a reason why a loss of market share to competitors need not result in higher prices for remaining customers.<sup>14</sup>

While interstate toll demand did grow at an unprecedented rate after competitive entry, the growth was not due to additional new services, advertising, consumer awareness, etc. The change in the growth rate is completely explained by changes in price, income and population. In Exhibit 3, we predict toll demand based on observed price, income and population and subtract the predicted value from the actual observed value. The rate of growth of this unexplained component of demand measures the rate at which the demand curve shifts outward, due to such non-price factors as marketing and advertising efforts. From the data, we observe that unexplained demand grew approximately 2.5 percentage points more slowly after divestiture: that is, changes in price, income and population more than explain the increase in the rate of growth of interstate toll demand after divestiture.<sup>15</sup> One explanation for this slowdown in the rate of growth of toll demand is bypass: toll demand may have expanded due to competition but the proportion of toll demand measured by switched access minutes of use may have fallen. To examine this possible explanation, we took the LEC estimates of traffic lost to bypass filed with the FCC as part of its Monitoring Report and added them to the switched access demand measurements. Using the sum of bypass and switched access minutes to measure toll growth from 1984 to 1990, we still observe slightly slower growth of unexplained demand in the competitive period. See Exhibit 3.

The same point was made in the recent price cap proceeding (CC Docket 87-313), where the Commission staff requested estimates of the demand stimulation for interstate

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<sup>11</sup>Competitive entry for U.S. interstate toll services differed in several important ways from unfettered free competition. The FCC instituted (i) access charge discounts for entrants to compensate for unequal access, (ii) non-cost-based access transport pricing which favored the smaller entrants to compensate for AT&T's locational advantage, and (iii) asymmetric regulation of AT&T which continues to this day.

<sup>12</sup>AT&T, "Long Lines Statistics, 1960-1982."

<sup>13</sup>FCC, "Trends in Telephone Service," August 30, 1990.

<sup>14</sup>NPRM, paragraph 66.

<sup>15</sup>If one believes competition began in the 1970s, this comparison of pre and post-divestiture growth rates may seem inappropriate. Nonetheless, (i) if competition had a significant effect on demand, one would expect to see it during the transition to equal access, and (ii) if the same comparison is done before and after 1978, the same result appears: unexplained demand grew approximately 1.7 percentage points more slowly in the 1979-89 post-competitive period than in the 1973-1978 period.

toll service stemming from the implementation of subscriber line charges and other exogenous cost changes in LEC access charge filings. As shown in Exhibit 4, the measure of demand stimulation deemed "reasonable" by the Commission in its Order,<sup>16</sup> accounts fully for the demand stimulation actually observed over the period.

While the FCC's policies for interstate toll services have resulted in enormous welfare gains for U.S. consumers, competition--or rather the type of regulated competition actually observed for interstate toll services--is not responsible for these benefits. In general, the FCC's rebalancing efforts led to dramatic reductions in interstate carrier access charges which, in turn, led to lower toll rates and increased toll demand. Despite the dramatic reduction of AT&T's share of U.S. interstate toll services, the substantial price reductions that might have been expected to arise from toll competition have yet to materialize.

The lesson that should be learned from the U.S. experience with interstate toll competition is that regulated competition need not provide the benefits suggested by the economists' idealized competition. Applied to the introduction of competition for special access transport services, we might expect disappointing results for consumers, since the main driver of consumer benefits from the price changes for interstate toll services--reductions in carrier access charges--is not available here in the same degree to produce similar benefits. In addition, the circumstances for interstate toll services after divestiture may have presented an easier setting in which to introduce competition than the conditions for access transport services today. General economic conditions are less favorable today than in the immediate post-divestiture period, and the basic growth rate of interstate toll minutes then was probably higher than the growth rate of the special access transport demand today. Thus AT&T was able to cushion its loss of market share to a greater extent than the LECs could cushion a similar loss in market share in transport today. AT&T's margin on toll service did not decrease significantly after competition began; prices were reduced only as a pass-through of carrier access charge changes. In contrast, the LECs' margin on special access transport services must decrease if they are to remain subject to competitive entry.

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<sup>16</sup> Second Report and Order, CC Docket 87-313, released October 4, 1990, Appendix C, paragraph 30.

**TABLE 1**  
**Changes in Carrier Access Charges**  
**and**  
**Changes in AT&T Interstate Toll Rates**

	Access Charge Changes	Other <sup>1</sup> Exogenous Cost Changes	Access & Cost Changes	AT&T Rate Changes	Cumulative Rate Changes
1/1/84	\$0		\$0		\$0
5/25/84	(\$1,400)		(\$1,400)	(\$1,400)	(\$1,400)
1/15/85	\$274		(\$1,126)		(\$1,400)
4/26/85			(\$1,126)	\$303	(\$1,097)
6/1/85	(\$1,157)		(\$2,283)	(\$1,157)	(\$2,254)
10/1/85	(\$525)		(\$2,808)		(\$2,254)
1/1/86			(\$2,808)	(\$135)	(\$2,389)
2/28/86			(\$2,808)	\$18	(\$2,371)
4/15/86			(\$2,808)	\$72	(\$2,299)
6/1/86	(\$2,000)		(\$4,808)	(\$2,000)	(\$4,299)
1/1/87	(\$1,865)		(\$6,673)	(\$1,865)	(\$6,164)
3/13/87			(\$6,673)	\$18	(\$6,146)
7/1/87	(\$593)		(\$7,266)	(\$593)	(\$6,739)
12/1/87			(\$7,266)	\$77	(\$6,662)
1/1/88	(\$772)	(\$524)	(\$8,562)	(\$772)	(\$7,434)
1/1/88			(\$8,562)		(\$7,434)
12/31/88- 7/1/90	(\$776)		(\$9,338)	(\$782)	(\$8,216)
Total	(\$8,814)	(\$524)		(\$8,216)	

<sup>1</sup>These are exogenous cost changes for AT&T other than access charge changes: specifically, reductions of \$315 million from the Tax Simplification Act of 1987 and \$209 million from 1987 pension accounting reform. See FCC, Second Further Notice, CC Docket 87-313, released April 17, 1989, Appendix C, page 4.

- Sources:
- (1) FCC, Appendix C, 2nd Further Notice, CC Docket 87-313, 4/17/89.
  - (2) AT&T, "Retrospective Analysis of AT&T's Productivity Growth, 1984-88," AT&T Comments on Further Notice of Proposed Rulemaking, CC Docket 87-313, Appendix D.
  - (3) FCC, Common Carrier Bureau, "AT&T's Performance Under Price Cap Regulation," Report to the Subcommittee on Telecommunications and Finance, Committee on Energy and Commerce, U.S. House of Representatives, October, 1990.

## REAL INTERSTATE TOLL RATES (NET OF ACCESS CHARGES) FELL FASTER BEFORE DIVESTITURE THAN AFTER

Absent changes in access charges, Exhibit 1 shows that interstate toll rates would have remained roughly constant in nominal terms from 1984 to 1990. In real terms, then, interstate toll rates would have fallen at about 3.6 percent per year (net of access charge changes), since the CPI-U for all commodities fell at an annual rate of 3.6 percent from 1984 to 1990.

This rate of decline of real toll rates (net of access charges) is low compared with the 1970s.<sup>17</sup> According to the Bureau of Labor Statistics producer price index, real interstate toll rates fell at about 2.6 percent annually from 1972 to 1983, which was a period in which interstate costs were increasing due to changes in separations generated by the Ozark formula. If we held the interstate NTS allocation fixed at its 1972 level, real interstate revenues would have grown 3.68 percentage points more slowly (per year) from 1972 to 1983.<sup>18</sup> Thus, adjusting for the change in the interstate NTS allocation, we find that real interstate toll rates would have fallen at an annual rate of 6.28 percent ( $2.6 + 3.68$ ) from 1972 to 1983. Since divestiture, real interstate toll rates (net of access charge changes) have declined at an annual rate of 3.6 percent -- about half the annual rate at which they declined in the decade prior to divestiture.

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<sup>17</sup> Although competition in switched services technically dates from 1974 or 1978 (when Execunet began and when Execunet was approved), it had little observable effect in the 1970s. Real interstate MTS prices fell at an annual rate of 4.8 percent between 1972 and 1974 and at 2.2 percent during the post-Execunet period from 1974 to 1983. The big price change often ascribed to competition is the post-divestiture toll price reductions which averaged about 9 percent in real terms from 1984-90. We show that these post-divestiture price reductions were not attributable to the competition experienced in the post-divestiture toll market.

<sup>18</sup> Between 1972 and 1982, the subsidy from interstate toll for the Bell System (in the form of non-traffic sensitive cost allocations) increased from \$1.570 billion to \$7.690 billion. (C.L. Weinhaus and A.G. Oettinger, Behind the Telephone Debates, Norwood, New Jersey: Ablex Publishing Corporation, 1988, p. 81.) At the same time, Bell System interstate revenues increased from \$6.493 billion to \$21.8 billion. (FCC, Form M (Monthly Report No. 1), various years) If the interstate NTS allocation had been held constant between 1972 and 1982, interstate revenues would have increased from \$6.493 billion to \$15.68 billion (where  $15.68 = 21.8 - 7.690 + 1.570$ ). Annual growth in interstate revenues thus was 12.88 percent, and annual growth in interstate revenue net of NTS allocation changes was 9.22 percent. The difference in the annual growth rate of revenue accounted for by the change in NTS cost allocation was thus 3.68 percentage points.

## GROWTH IN DEMAND DUE TO COMPETITION

We compare the decade before divestiture (1972-1982) with the period after divestiture (1984-1988).<sup>19</sup> In each period, we divide actual demand growth into two parts:

1. predicted growth: a part due to changes in prices, income, and population and
2. exogenous growth: a (residually-measured) part due to other changes--changes in taste, changes in the market place (such as competitive entry) etc.

If competition shifts the demand curve outward due to advertising, the availability of new products or services, or a heightened awareness of the possibility of telephone service, we would expect to see that shift as an increase in exogenous growth.

Using conventional measures of the responsiveness of demand to changes in price, income, and population, we calculate the rate of growth of exogenous demand. In the 1972-82 period, demand was predicted to grow at an annual rate of 4.06 percent. Actual demand growth averaged 8.92 percent, leaving a growth rate of exogenous demand of 4.86 percent. In the 1984-88 period, demand growth was predicted to average 11.05 percent and actual demand growth averaged 13.44 percent. Thus the growth rate of exogenous demand in the 1984-88 period averaged 2.39 percent. Growth in demand unexplained by changes in price, income, and population averaged 2.47 percentage points lower in the 1984-88 period compared with the 1972-82 period. See Table 2. Table 2A provides the same analysis, comparing the pre-ENFIA period with the post-ENFIA period (1972-78 with 1979-89) and obtains the same qualitative result.

One explanation of this reduction in the growth rate of exogenous demand after divestiture is the growth of bypass. Interstate toll demand is measured as interstate switched access demand after divestiture, and the growth of bypass demand--including MEGACOM and WATS-type services--would mask growth in toll demand after divestiture. To adjust our results for the possibility of bypass, we estimate interstate bypass usage from 1984 through 1990 and add that usage to our measure of switched access demand. Calculation of the bypass adjustment is outlined below. The results are shown in Table 2, where it is evident that adjusting for bypass growth does not reverse our earlier finding: growth in interstate toll demand (adjusted for bypass) unexplained by economic factors averaged 1.13 percentage points lower between the 1984-88 period compared with the 1972-82 period.

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<sup>19</sup> Again, we treat the post-divestiture period as the competitive period, although the same analysis as that described below yields the same qualitative results if applied to the 1972-78, 1979-1990 periods. To judge the effects of competition on demand growth, it is useful to note that MCI and Sprint advertising was less than \$5 million in 1980 compared with \$45 million for AT&T (measured in 1986 dollars). Between 1983 and 1984, total annual advertising for AT&T, MCI and Sprint increased from about \$100 million to about \$150 million (in 1986 dollars). See Michael Porter, op. cit., Figure 23.

TABLE 2

PERIOD	GROWTH IN PRICE	GROWTH IN INCOME/POP	GROWTH IN POP	PRICE EFFECT  ELAS= -0.72	INCOME EFFECT  ELAS= 0.80	POP EFFECT  ELAS= 1.00	TOTAL EFFECT: PREDICTED GROWTH	ACTUAL GROWTH	EXOGENOUS GROWTH	(INCLUDING BYPASS) ACTUAL GROWTH	EXOGENOUS GROWTH
1972-82	-2.65X	1.28X	1.03X	1.95X	1.02X	1.03X	4.06X	8.92X	4.87X	8.92X	4.87X
1984-88	-10.30X	2.13X	0.97X	8.14X	1.70X	0.97X	11.05X	13.44X	2.39X	14.78X	3.73X
DIFFERENCE	-7.65X	0.85X	-0.06X	6.19X	0.68X	-0.06X	7.00X	4.52X	-2.48X	5.86X	-1.13X

	PPI			PER-CAPITA	
	GDP-PPI	INTERSTATE TOLL NOMINAL	REAL	POP	REAL INCOME
1972	50.3	100.0	100.0	180,671	\$6,036
1980	86.1	124.6	144.7	205,052	\$8,134
1982	100.0	152.0	152.0	209,896	\$8,562
1984	100.3	148.8	137.4	227,757	\$9,722
1988	123.9	110.2	88.9	232,520	\$9,725
1989	129.5	108.3	83.6	237,001	\$10,419
				246,329	\$11,337
				248,777	\$11,531
GROWTH					
1960-82				1.21X	2.30X
72-82	7.11X	4.28X	-2.65X	1.03X	1.28X
72-84	6.40X	3.37X	-3.83X	1.02X	1.65X
84-88	3.42X	-7.23X	-10.30X	0.97X	2.13X

SOURCES: BLS

SOURCES: 1990 STATISTICAL ABSTRACT: TABLES 2, 695  
1989 INCOME: 7/90 SURVEY OF CURRENT BUSINESS

## LONG LINES MESSAGE VOLUMES AND HOLDING TIMES

	MESSAGES	TIME	MINUTES
1962	1,173,079	6.88	8,070,784
1970	2,716,007	7.84	21,277,815
1972	3,216,010	7.83	25,181,358
1980	6,440,602	8.65	55,711,207
1982	6,827,695	8.67	59,196,116

GROWTH			
1962-82	9.21X		10.48X
1972-82	7.82X		8.92X
1978-80	9.03X		10.10X

SOURCE: LONG LINES STATISTICS: 1960-1982

## INTERSTATE SWITCHED ACCESS MINUTES

	USAGE	EST BYPASS	TOTAL
1984-03	37.5	8.93	46.4
8803	62.1	18.5	80.6
8903	69.7	19.9	89.6
9001	73.2	20.6	93.8

GROWTH			
1984-88	13.44X		14.78X
1984-89	13.20X		14.05X
1984-90	12.93X		13.64X

SOURCE: FCC "TRENDS IN TELEPHONE SERVICE"  
AUGUST 20, 1990, TABLE 15.

TABLE 2A

PERIOD	GROWTH IN PRICE	GROWTH IN INCOME/POP	GROWTH IN POP	PRICE EFFECT  ELAS= -0.72	INCOME EFFECT  ELAS= 0.80	POP EFFECT  ELAS= 1.00	TOTAL EFFECT: PREDICTED GROWTH	ACTUAL GROWTH	EXOGENOUS GROWTH	(INCLUDING ACTUAL GROWTH	BYPASS) EXOGENOUS GROWTH
1972-78	-2.80%	2.16%	0.98%	2.06%	1.73%	0.98%	4.85%	9.95%	5.10%	9.95%	5.10%
1979-89	-5.88%	1.61%	1.01%	4.46%	1.29%	1.01%	6.87%	10.28%	3.41%	10.81%	3.94%
DIFFERENCE	-3.08%	-0.55%	0.02%	2.40%	-0.44%	0.02%	2.02%	0.33%	-1.70%	0.86%	-1.16%

	PPI				PER-CAPITA	
	GDP-PPI	INTERSTATE TOLL NOMINAL	REAL		POP	REAL INCOME
1972	50.3	100.0	198.8	1972	209,896	\$8,562
1978	72.7	121.9	167.7	1978	222,585	\$9,735
1979	78.8	120.8	153.3	1979	225,055	\$9,829
1989	129.5	108.3	83.6	1989	248,777	\$11,531
GROWTH				GROWTH		
72-78	6.33%	3.36%	-2.80%	72-78	0.98%	2.16%
79-89	5.09%	-1.09%	-5.88%	79-89	1.01%	1.61%

SOURCES: BLS

SOURCES: 1990 STATISTICAL ABSTRACT: TABLES 2,695  
1989 INCOME: 7/90 SURVEY OF CURRENT BUSINESS

LONG LINES MESSAGE VOLUMES AND HOLDING TIMES			
	MESSAGES	HOLDING TIME	MINUTES
1972	3,216,010	7.83	25,181,358
1978	5,328,034	8.35	44,489,084
1979	5,953,960	8.49	50,549,120
1982	6,827,695	8.67	59,196,116

GROWTH		
1972-78	8.78%	9.95%
1979-1982	4.67%	5.40%

SOURCE: LONG LINES STATISTICS: 1960-1982

INTERSTATE SWITCHED ACCESS MINUTES			
	USAGE	EST BYPASS	TOTAL
1984-85	37.5	8.93	46.4
8803	62.1	18.5	80.6
8903	69.7	19.9	89.6
9001	73.2	20.6	93.8

GROWTH		
1984-89	13.20%	14.05%
1979-1989	10.28%	10.81%

SOURCE: FCC "TRENDS IN TELEPHONE SERVICE"  
AUGUST 20, 1990, TABLE 15.

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**Bypass Volumes: 1984-90**

Total (intrastate plus interstate) bypass minutes were estimated by the RBOCs and GTE in three surveys conducted by the FCC. The results are reported in the FCC

**Table 3  
Growth in Special Access Lines**

	SPECIAL ACCESS LINES
1984	1,128,924
1985	1,320,228
1986	1,760,741
1987	1,995,739
1988	3,192,682
GROWTH	29.68%

Monitoring Report, (July, 1990), Tables 6.1 and 6.3. We multiply those minutes of use by the fraction of minutes which are interstate ( $1/(1+0.368) = 0.73$ ) from the Huber Report) to obtain interstate switched access minutes of use which are bypassed for the years 1988, and 1889. An estimate for 1984 is calculated by observing the growth rate in special access lines (from the FCC Statistics of Communication Common Carriers, 1984-1988) and assuming the growth rates of special access lines and bypass minutes between 1984 and

1988 are the same. An estimate for 1990 is obtained by extrapolating the 1989 estimates

Table 4  
Switched Access Minutes

	INTERSTATE SWITCHED ACCESS MOU	ESTIMATED BYPASS MOU	TOTAL SWITCHED MOU
1984-Q3	37.5	6.5	44.0
88Q3	62.1	18.5	80.6
89Q3	69.7	19.9	89.6
90Q1	73.2	20.6	93.8

using the 1988-89 growth rate. See Tables 3<sup>20</sup> and 4.<sup>21</sup>

We then add to the bypass minutes for the years 1984, 1988, 1989, and 1990, interstate switched access minutes as reported in the FCC Trends in Telephone Service (August 20, 1990), Table 15, to obtain total switched access minutes of use (including bypass minutes). See Table 4.

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<sup>20</sup>Source: FCC, Statistics of Communications Common Carriers.

<sup>21</sup>Source: (1) FCC Trends in Telephone Service: 8/20/90, Table 15, (2) FCC Monitoring Reports: adjusted for inter/intra; (3) 1984-q3 bypass from % increase in special access lines; (4) 1990 bypass from 88-89 growth rate.

DEMAND STIMULATION FROM SUBSCRIBER LINE CHARGES  
AND EXOGENOUS COST CHANGES

LEC interstate revenue requirements recovered from IXCs fell sharply after divestiture due to the increase in subscriber line charges and to the implementation of several exogenous cost changes. Table 5 shows LEC interstate revenue with and without these exogenous changes.<sup>22</sup>

Table 5  
Carrier Switched Access Revenue Changes

Period	CCL + TS Revenue (R <sub>0</sub> )	Cumulative Exog Cost Changes	Change in Authorized Rate of Return	Change in CPE and IW Rev Req	SLC Revenue	CCL + TS Revenue R <sub>1</sub>
1984-85	\$14,464,181	\$0	\$0	\$0	(\$1,296,104)	\$15,760,285
1985-86	\$14,955,910	(\$206,574)	\$0	(\$627,112)	(\$4,484,658)	\$20,274,255
1986-87	\$13,669,242	(\$509,107)	(\$191,916)	(\$1,836,941)	(\$3,646,949)	\$19,854,155
1988	\$13,680,660	(\$1,090,281)	(\$343,170)	(\$1,821,257)	(\$4,563,679)	\$21,499,046
1989 (4-12)	\$12,713,833	(\$1,345,326)	(\$352,751)	(\$1,973,689)	(\$5,676,620)	\$22,062,219
1990-91	\$12,148,199	(\$1,744,907)	(\$339,278)	(\$2,409,425)	(\$6,069,004)	\$22,710,813

These reductions in revenue requirements caused interstate carrier access prices to fall and, in turn, caused interstate toll prices to fall. The demand stimulation resulting from the reduction in interstate toll prices can be calculated if the price elasticity of demand for interstate toll service and the fraction of IXC cost represented by access charges are known. For simplicity, we assume the demand function for LEC interstate switched access usage has a constant elasticity given by  $\beta$ , so that

$$q_i = A p_i^{\beta} \quad (i = 1, 0),$$

and

$$R_i = A_i q_i = A_i \times A p_i^{\beta} = A p_i^{\beta + 1}.$$

<sup>22</sup>Source: United States Telephone Association, Ex Parte in CC Docket 87-313, filed 8/6/09, Tables 2 and 5.

It then follows that:

$$\frac{R_1}{R_0} = \left( \frac{p_1}{p_0} \right)^{\beta + 1},$$

so that

$$\frac{p_1}{p_0} = \left( \frac{R_1}{R_0} \right)^{\frac{1}{\beta + 1}}.$$

Thus the price change required to obtain a 10 percent revenue change differs from 10 percent. Rather than using a percentage price change calculated in this manner to calculate demand response, we can directly solve for the quantity  $q_1$  which would result from imposing a price increase of the magnitude necessary to increase revenues from  $R_0$  to  $R_1$ :

$$\frac{q_1}{q_0} = \left( \frac{p_1}{p_0} \right)^{\beta} = \left( \frac{R_1}{R_0} \right)^{\frac{\beta}{\beta + 1}},$$

so that

$$q_1 = \left( \frac{R_1}{R_0} \right)^{\frac{\beta}{\beta + 1}} \times q_0.$$

The decrease in carrier access revenue due to the reduction in switched access prices caused by the recovery of SLC revenue from end users and the implementation of exogenous cost changes thus causes an interstate usage increase from  $q_0$  to  $q_1$ . We will take the difference  $q_1 - q_0$  as our measure of interstate switched access demand stimulation caused by the implementation of SLCs and exogenous cost changes. Using data from the recent price cap filings, we see that demand stimulation from SLCs and exogenous cost changes accounts for about 4.7 percentage points of annual growth since 1984. See Table 6.<sup>23</sup> Annual interstate toll growth averaged about 10.5 percent before divestiture (1962-82) and 12.9 percent after divestiture (1984-90).<sup>24</sup> Approximately 4.7 percentage points of the post-divestiture demand growth were due to carrier access charge reductions (stemming from SLCs and exogenous cost changes). Hence regulatory actions by the FCC explain more than the difference in demand growth before and after divestiture.

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<sup>23</sup>Sources: (1) 7/27/90 USTA Ex Parte, CC Docket 87-313, Table 1; (2) 8/6/90 Ex Parte, Table 8; (3) (2)/(1); (4) (1)-(3); and (5) (1)-(4).

<sup>24</sup>AT&T, "Long Lines Statistics, 1960-1982," and FCC, "Trends in Telephone Service," August 20, 1990.

Table 6  
Demand Stimulation From SLCs and Exogenous Cost Changes

	BASLINE CL DEMAND (1)	ESTDMATED CL STIM (2)	PERCENT CL STIM (3)	ESTDMATED CL UNSTIM (4)	ANNUAL GROWTH DIFF DUE TO STIM (5)
1984	180,139,810	6,493,872	4.06%	183,646,138	
1988	244,467,327	47,892,584	19.59%	196,574,743	
1989	281,422,756	66,700,270	23.35%	215,722,486	
1990-91	319,437,082	83,216,292	26.05%	236,220,790	
GROWTH:1984-					
1988	11.16%			6.35%	4.80%
1989	11.94%			7.02%	4.91%
1990	12.20%			7.43%	4.77%

**EXHIBIT B**

**EFFECTS OF COMPETITIVE ENTRY IN THE U.S.  
INTERSTATE TOLL MARKETS:  
AN UPDATE**

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## EFFECTS OF COMPETITIVE ENTRY IN THE U.S. INTERSTATE TOLL MARKETS

### A. Prologue and Summary

This study was originally performed in August 1991, and was filed with the Federal Communications Commission in CC Docket No. 91-141. It addressed the extent to which competitive pressures in the interstate toll market led to lower toll rates and an expansion of toll demand. It found that reductions in carrier access charges more than accounted for reductions in AT&T's toll prices, and that the reduction in toll prices more than accounted for the growth in interstate toll demand.

We have updated the study using data through 1992. The results are unchanged:

- Regulated competition in the interstate toll market has not led to price competition. While annual carrier access charges paid by AT&T have fallen by \$10.131 million from 1984 through 1992, AT&T annual prices have fallen by only \$8,223 million.
- When you account for the changes in access charges billed to AT&T, toll prices actually declined faster before divestiture than after. Even if AT&T's prices had remained constant (net of access charges), the rate of decline of real toll prices (net of access charges) would have been about half the rate at which they declined (net of separations changes) in the decade prior to divestiture.
- Regulated competition in the interstate toll market has not led to an expansion of demand. Toll demand grew no more than would be expected, based on price, income, and population changes.

While the FCC's policies for interstate toll services have resulted in enormous welfare gains for U.S. consumers, competition--or rather the type of regulated competition actually observed for interstate toll services--is not responsible for these benefits. In general, the FCC's rebalancing efforts led to dramatic reductions in interstate carrier access charges which, in turn, led to lower toll rates and increased toll demand. But the substantial price reductions that might have been expected to arise from toll competition have yet to materialize.

B. Introduction

In its Notice of Proposed Rulemaking and Notice of Inquiry in CC Docket No. 91-141, (released May 6, 1991), the Commission suggested that historical evidence supports the view that entry and regulated competition have brought benefits to consumers of U.S. interstate long distance services. In particular,

"...competition in the provision of interstate long-distance service has led to sharply reduced rates, a larger variety of service options, and more rapid deployment of new technologies..." (¶11).

Indeed, since divestiture and equal access transformed interstate long-distance services, prices have fallen and demand has grown at unprecedented rates. While it is tempting to ascribe these changes to the pressures of competition, careful analysis shows that the Commission's policy of rebalancing local and toll rates is directly and entirely responsible for the overall reduction in long distance rates. There is no evidence that entry and competition--as experienced to date for U.S. long-distance services--have had any effect in reducing prices or expanding output in the interstate long distance market.

C. Price Changes

Long-distance prices fell faster (in real terms) since divestiture than their long-run historical average: from 1984 to 1991, real interstate toll rate reductions averaged about 8.18 percent annually.<sup>2</sup> From 1972-1983, the longest pre-divestiture period over which interstate rate data are compiled by the Bureau of Labor Statistics, interstate toll rates declined at an annual average (real) rate of 2.7 percent. Since the post-divestiture period coincides with the period for which equal access was available and during

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<sup>1</sup>Expanded Interconnection with Local Telephone Company Facilities, CC Docket No. 91-141, Notice of Proposed Rulemaking and Notice of Inquiry (released May 6, 1991) ("NPRM" or "NOI").

<sup>2</sup>Using the Bureau of Labor Statistics producer price index for interstate toll rates, deflated by the BLS GNP-PI.

which AT&T lost some of its substantial market share,<sup>3</sup> it is tempting to attribute these additional price reductions to direct competition among interexchange carriers. But that would be wrong.

From 1984 to 1990, the FCC undertook a fundamental rebalancing of local access and toll rates in the United States, primarily through two related activities. First, the FCC instituted subscriber line charges (end user common line charges) by which interstate non-traffic sensitive costs were recovered directly from end users on a flat rate basis rather than from toll usage charges. Beginning in 1984, subscriber line charge revenues grew from approximately \$1.296 billion to \$6.069 billion in 1990-91, and all of that revenue represented lower carrier access charges paid by the interexchange carriers.<sup>4</sup> Second, the FCC instituted a number of separations changes which effectively reduced interstate costs while increasing intrastate costs. The net effect of separations changes (and other regulatory changes, including changes in income tax rates) was to reduce carrier access charges an additional \$4.493 billion (annually) by 1990.<sup>5</sup> By 1990, carrier access charge expenditures were approximately \$9.266 billion less per year because of these changes in federal regulatory policy.

Thus access charges, which constitute a large fraction of the marginal cost of interexchange carriers, fell significantly over the post-divestiture period due to the implementation of subscriber line charges and changes in separations policy. Indeed, AT&T lowered its interstate toll rates over this period, reflecting this reduction in its marginal cost. However, AT&T's total price reduction over this period was substantially less than the amount by which its access charges were reduced. See Exhibit 1.

This finding is important in interpreting the U.S. experience with competition for interstate toll services. It suggests that beyond the mandatory reflection of access charge reductions in AT&T's rates, which were then followed by the other IXC's, interexchange carriers initiated no significant price

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<sup>3</sup>The FCC calculates that AT&T's market share of switched access minutes of use fell from 84.2 percent in the third quarter of 1984 to 62.8 percent in the fourth quarter of 1991: see Federal Communications Commission, "Long Distance Market Shares Fourth Quarter, 1991," Analysis Division, Common Carrier Bureau, March 24, 1992, Table 3. The FCC calculations show that AT&T's market share loss stopped its decline in the second quarter of 1990 and has risen slightly since then.

<sup>4</sup>United States Telephone Association, ex parte presentation to the FCC, CC Docket 87-313, filed August 6, 1990, Table 2.

<sup>5</sup>Ibid., Table 5.

competition for toll services.<sup>6</sup> Indeed, the current situation could better be described as a regulated price umbrella: MCI and Sprint generally followed AT&T price reductions but the gap in prices shrunk from 10-20 percent in mid-1984 to about 5 percent in 1987 when the unequal access discount was essentially eliminated.<sup>7</sup>

This lack of price reductions among the LXC's is surprising because we observe comparatively large reductions in real interstate toll rates (adjusted for changes in access charges) during the period before divestiture and equal access.<sup>8</sup> If we adjust interstate toll rates to account for the changes in the non-traffic sensitive cost assignment in the Ozark Plan between 1972 and 1984, we observe that real interstate toll rates, net of changes in separations, fell at an annual rate of 6.28 percent.<sup>9</sup> See Exhibit 2. Since divestiture (1984-1991), inflation averaged approximately 3.70 percent per year. If we (conservatively) treat AT&T nominal interstate toll prices as constant (net of access charge changes), real interstate toll rates, net of changes in access charges, fell at an annual rate of less than 3.70 percent. Net of access charge changes, then, real interstate toll rates fell roughly twice as fast in the decade before divestiture than in the seven years after. This finding is hardly consistent with the view that competition among interexchange carriers led to drastically lower prices. Rather, it suggests that the type of competitive entry experienced for U.S. interstate toll services since divestiture may not encourage price rivalry for ordinary interstate toll calling.<sup>10</sup>

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<sup>6</sup>This generalization applies to aggregate interstate toll service. There is evidence of competitive pressure reducing toll rates (i) paid by large business customers (e.g., through new services such as Megacom, Prism, and Ultra-WATS), and (ii) in the intrastate toll markets where long-haul rates fell and short-haul rates rose from 1983 to 1987 (see A. Mathios and R. Rogers, "The Impact of Alternative Forms of State Regulation of AT&T on Direct-Dial Long-Distance Telephone Rates," The Rand Journal of Economics, Autumn 1989, p. 446).

<sup>7</sup>See Michael E. Porter, "Competition in the Long Distance Telecommunications Market: An Industry Structure Analysis," filed with AT&T's Comments in CC Docket 87-313, October 19, 1987.

<sup>8</sup>Competition in interstate switched services technically began in 1974 with the entry of MCI's Execunet Service.

<sup>9</sup>1972 is the earliest year for which BLS price data for interstate toll service is available.

<sup>10</sup>Competitive entry for U.S. interstate toll services differed in several important ways from unfettered free competition. The seven regional (former) Bell holding companies are barred from the market, and GTE is subject to a decree which regulates its participation. In addition, the FCC instituted (i) access charge discounts for entrants to compensate for unequal access, (ii) non-cost-based access transport pricing which favored the smaller entrants to compensate for AT&T's locational advantage, and (iii) asymmetric regulation of AT&T which continues to this day.

#### D. Demand Growth

A second possible consequence of competition for interstate toll services was growth in demand. While changes in the units of measurement make it difficult to compare pre- and post-divestiture interstate toll growth rates, the evidence suggests that toll demand grew more rapidly in the post-divestiture period. Between 1962 and 1982, annual growth in interstate minutes of use averaged 10.5 percent.<sup>11</sup> From 1984 to 1991, interstate switched access minutes of use grew at an annual rate of 11.81 percent,<sup>12</sup> and this measure of demand probably understates demand growth, as it ignores demand served by bypass services, including WATS and MEGACOM-type services. Competition is sometimes alleged to have caused this increase in demand through reducing prices and also through increasing marketing activities (such as advertising) and the introduction of new services. Indeed, in its Notice of Proposed Rulemaking in CC Docket 91-141, the Commission cites overall traffic growth as a reason why a loss of market share to competitors need not result in higher prices for remaining customers.<sup>13</sup>

While interstate toll demand did grow at an unprecedented rate after competitive entry, the growth was not due to additional new services, advertising, consumer awareness, etc. The change in the growth rate is completely explained by changes in price, income and population. In Exhibit 3, we predict toll demand based on observed price, income and population and subtract the predicted value from the actual observed value. The rate of growth of this unexplained component of demand measures the rate at which the demand curve shifted outward, due to such non-price factors as marketing and advertising efforts. From the data, we observe that unexplained demand grew approximately 1.91 percentage points more slowly after divestiture: that is, changes in price, income and population more than explain the increase in the rate of growth of interstate toll demand after divestiture.<sup>14</sup>

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<sup>11</sup>AT&T. "Long Lines Statistics, 1960-1982."

<sup>12</sup>Federal Communications Commission. "Trends in Telephone Service." February, 1992, Table 24.

<sup>13</sup>NPRM, paragraph 66.

<sup>14</sup>If one believes competition began in the 1970s, this comparison of pre and post-divestiture growth rates may seem inappropriate. Nonetheless, if the same comparison is done before and after 1978, the same result appears: unexplained demand grew approximately 1.82 percentage points more slowly in the 1979-91 post-competitive period than in the 1972-1978 period. See Exhibit 3, Table 2A.

One explanation for this slowdown in the rate of growth of toll demand is bypass: toll demand may have expanded due to competition but the proportion of toll demand measured by switched access minutes of use may have fallen. To examine this possible explanation, we took the LEC estimates of traffic lost to bypass filed with the FCC as part of its Monitoring Report and added them to the switched access demand measurements. Using the sum of bypass and switched access minutes to measure toll growth from 1984 to 1991, we still observe slower growth of unexplained demand in both the post-competition period and the post-divestiture period. See Exhibit 3.

The same point was made in the recent price cap proceeding (CC Docket 87-313), where the Commission staff requested estimates of the demand stimulation for interstate toll service stemming from the implementation of subscriber line charges and other exogenous cost changes in LEC access charge filings. As shown in Exhibit 4, the measure of demand stimulation deemed "reasonable" by the Commission in its Order,<sup>13</sup> accounts fully for the demand stimulation actually observed over the period.

#### E. Conclusions

Consumers have benefitted enormously from lower interstate toll prices and expanded interstate toll demand. However, competition in the interstate toll market is not responsible for either of those benefits. Reductions in the carrier access charges paid by AT&T outweigh AT&T's toll price reductions, and the increase in toll demand is more than explained by changes in toll prices, income and population.

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<sup>13</sup>Second Report and Order, CC Docket 87-313, released October 4, 1990, Appendix C, paragraph 30.

## THE REDUCTION IN AT&T'S ACCESS CHARGES EXCEEDS THE REDUCTION IN ITS TOLL PRICES

In Table 1, we list each date on which a substantial access charge change or AT&T price change occurred, the dollar amount of the access cost reduction experienced by AT&T,<sup>16</sup> and the dollar amount of revenue change forecasted by AT&T as a result of its price change. All data through 9/17/88 were taken from FCC and AT&T filings in the price cap docket.<sup>17</sup> The 7/1/89 and 7/1/90 data were taken from the FCC's report on AT&T's performance under price caps.<sup>18</sup> The 1/1/90 and 1/1/91 data are taken from AT&T filings, as reported by Victor Glass of the National Exchange Carrier Association. The remaining access charge and price changes are taken from AT&T price cap filings.<sup>19</sup>

It is unlikely that every AT&T price change or access charge change since AT&T went under price caps on July 1, 1989 is accounted for in Table 1. However, we can check our work by calculating the total AT&T price reduction directly from AT&T's actual price index (API) reported in their latest (May 15, 1992) price cap filing. Table 1A gives the total percentage and dollar annual rate reductions implemented by AT&T since January 1989, July 1989, and July 1990. Evaluated at 1992 demand levels, AT&T price reductions since January 1989 totalled \$1,193.0 million per year; our calculation in Table 1, where each price reduction is evaluated at current demand, shows a total annual rate reduction over the period of \$1,239 million. The small difference in these estimates is due to (i) additional AT&T price changes other than those listed in Table 1 and (ii) the different revenue bases used to evaluate the changes in price. Table 1 shows that during that period, AT&T experienced annual access charge reductions totalling approximately \$2,118 million, evaluated at the concurrent level of demand.

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<sup>16</sup>At forecasted demand levels that include stimulation from anticipated AT&T rate reductions.

<sup>17</sup>FCC. Appendix C. 2nd Further Notice, CC Docket 87-313, 4/17/89, and AT&T, "Retrospective Analysis of AT&T's Productivity Growth, 1984-88," AT&T Comments on Further Notice of Proposed Rulemaking, CC Docket 87-313, Appendix D, 7/26/88.

<sup>18</sup>FCC. Common Carrier Bureau, "AT&T's Performance Under Price Cap Regulation," Report to the Subcommittee on Telecommunications and Finance, Committee on Energy and Commerce, U.S. House of Representatives, October, 1990, Chart II-B.

<sup>19</sup>The 7/1/91 cost and rate change data were taken from AT&T's May 17, 1991 Annual Access Charge Filing and Transmittal No. 3242, filed June 29, 1991. The 12/19/91 data was taken from AT&T Transmittal No. 3734, filed 12/19/91. The 7/1/92 data comes from AT&T's 1992 Annual Price Cap filing dated 5/15/92.

Table 1  
Changes in Carrier Access Charges and  
Changes in AT&T Interstate Toll Rates  
(\$ Million)

Date	Access Charge Change	Other Exogenous Cost Changes	Cumulative Cost Changes	AT&T Price Changes	Cumulative AT&T Price Changes
1/1/84	\$0	\$0	\$0	\$0	\$0
5/25/84	(\$1,400)		(\$1,400)	(\$1,400)	(\$1,400)
1/15/85	\$274		(\$1,126)		(\$1,400)
4/26/85			(\$1,126)	\$303	(\$1,097)
6/1/85	(\$1,157)		(\$2,283)	(\$1,157)	(\$2,254)
10/1/85	(\$525)		(\$2,808)		(\$2,254)
1/1/86			(\$2,808)	(\$135)	(\$2,389)
1/11/86	\$25		(\$2,783)	\$248	(\$2,141)
2/28/86			(\$2,783)	\$18	(\$2,123)
4/15/86			(\$2,783)	\$72	(\$2,051)
6/1/86	(\$2,000)		(\$4,783)	(\$2,000)	(\$4,051)
1/1/87	(\$1,865)		(\$6,648)	(\$1,865)	(\$5,916)
3/13/87			(\$6,648)	\$18	(\$5,898)
7/1/87	(\$593)		(\$7,241)	(\$593)	(\$6,491)
12/1/87			(\$7,241)	\$77	(\$6,414)
1/1/88	(\$772)	(\$524)	(\$8,537)	(\$772)	(\$7,186)
6/17/88			(\$8,537)	\$28	(\$7,158)
9/17/88			(\$8,537)	\$174	(\$6,984)
7/1/89	(\$776)		(\$9,313)	(\$785)	(\$7,769)
1/1/90	(\$385)	(\$141)	(\$9,839)	(\$267)	(\$8,036)
7/1/90	(\$482)	(\$143)	(\$10,464)	(\$192)	(\$8,228)
1/1/91	\$0	(\$1)	(\$10,595)	(\$84)	(\$8,312)
7/1/91	(\$251)	(\$9)	(\$10,855)	\$18	(\$8,294)
12/19/91	\$97	(\$25)	(\$10,783)	\$71	(\$8,223)
7/1/92	(\$191)	\$110	(\$10,864)	\$0	(\$8,223)
TOTAL	(\$10,131)	(\$733)	(\$10,864)	(\$8,223)	(\$8,223)

Table 1A  
AT&T Price Changes Under Price Caps

	1992 API	7/1/90 API	7/1/89 API	1/1/89 API
BASKET 1	0.943	0.943	0.984	1.000
BASKET 2	0.939	0.928	0.973	1.000
BASKET 3	0.979	0.931	0.970	1.000
	1992 BASE REVENUE	7/1/90	7/1/89	1/1/89
BASKET 1	\$17,762	\$0	(\$746)	(\$1,012)
BASKET 2	\$2,935	\$35	(\$102)	(\$179)
BASKET 3	\$96	\$5	\$1	(\$2)
TOTAL	\$20,793	\$40	(\$847)	(\$1,193)
PERCENT	100.00%	0.19%	-4.07%	-5.74%
SOURCE: FCC: 10/90 PRICE CAPS REPORT AT&T: 5/15/92 PRICE CAPS FILING				